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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/867,892

05/30/2001

Rob Anne Beuker

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

P.O. BOX 3001

BRIARCLIFF MANOR, NY 10510

EXAMINER

EDWARDS, PATRICK L

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 09/09/2004

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/867,892

Applicant(s)

BEUKER ET AL.

Examiner

Patrick L Edwards

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. The response received on June 17, 2004 has been placed in the file and was considered by the examiner. An action on the merits follows.

Response to Arguments

2. The applicant's arguments, filed on June 17 2004, have been fully considered. A response to these arguments is provided below.

Drawings

Summary of Argument: The applicant has amended the drawings to eliminate repetition in the numbering of certain elements in the Figures.

Examiner's Response: The examiner greatly appreciates the received drawing corrections. All problems with the drawings have been corrected.

35 USC 112, First and Second Paragraph Rejections

Summary of Argument: The applicant has amended the claims to eliminate the 112 – 2nd paragraph rejections from the prior action. The applicant argues that the 112 – 2nd paragraph rejections should be withdrawn.

Examiner's Response: The examiner agrees. The 112 – 2nd paragraph rejections made in the original action are hereby withdrawn.

Prior Art Rejections

Summary of Argument: The applicant argues that the combination of references used in the prior action fails to teach all of the limitations of the amended independent claim 1 (applicant's remarks pg. 18-19).

Examiner's Response: The examiner agrees that the combination of references used in the prior action fails to teach the *amended* independent claim 1. The applicant's amendment, however, has necessitated further search and, consequently, a new grounds of rejection will be provided below.

The applicant's argument is considered moot in view of the new grounds of rejection.

Summary of Argument: The applicant additionally argues that the recognition of the problem, or of the source of the problem, is not obvious even though the solution to the problem may be obvious (applicant's remarks pg. 19).

Examiner's Response: The examiner disagrees. With regard to the prior rejection, the Jasinski reference was brought in as a reference which teaches translating the original coordinate system of an image in order to substantially minimize average coordinate ranges of the 2D coordinates found. The examiner asserts that this

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teaching in the Jasinski references represents both the recognition and the solution of a problem. The problem being that computations involving the larger pre-translated coordinate system are unstable. The recognition and solution to this problem is provided explicitly in Jasinski (Jasinski col. 6 line 62 – col. 7 line 2).

As was stated above, the arguments with respect to the additional (added) limitations of independent claim 1 are considered moot in view of the new grounds of rejection.

Summary of Argument: The applicant further argues that the combination of references is improper (applicant's remarks pg. 20-21).

Examiner's Response: The examiner disagrees. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

The examiner would like to note that motivation to combine the references was provided in the prior action and will be further provided below. Since the motivation to combine references is explicitly provided in the reference(s), we can conclude that the combination did not rely on impermissible hindsight reasoning.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 6 and 8-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Lobregt et al. (USPN 6,078,699).

With regard to claim 11, which is representative of claims 6 and 8, Lobregt discloses an x-ray source for projecting a beam of x-rays through an object to be examined, and an x-ray detector for obtaining digital x-ray images which are projections of the object (Lobregt col. 5 line 24 – col. 6 line 36 with Figure 1).

Lobregt further discloses a processor responsive to pairs of overlapping x-ray images obtained by the x-ray detector and configured to perform a method (Lobregt col. 4 line 58 – col. 5 line 5). The limitation regarding “the method of claim 1” recited in the claim is not given any patentable weight in this claim as it is simply reciting an

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intended use for the processor and does not further limit the claimed apparatus. It follows that the processor of Lobregt could also be configured to perform the method of claim 1. The applicant is invited to consult chapter 2114 of the MPEP for further information regarding the interpretation of apparatus claims.

Lobregt further discloses a display for viewing the pair of images merged by the processor (Lobregt col. 6 lines 1-2 with Figure 1).

With regard to claim 9, Lobregt further discloses a network connection across which the images are received (Lobregt Figure 1). Referring to Figure 1, the connecting line between element 13 and element 20 is analogous to a network connection as recited in the claim in that the image processing system inherently receives the images via some sort of data transport mechanism (or 'network connection').

With regard to claim 10, computer processors inherently comprise a means for reading a computer-readable recording medium. Therefore, the processor disclosed in Lobregt inherently comprises a means for reading a computer readable medium.

With regard to claim 12, Lobregt further discloses means for jointly rotating the x-ray source and the x-ray detector about an axis (Lobregt col. 5 lines 27-32 in conjunction with Figure 1). The C-arm disclosed in Lobregt is analogous to the means for rotation about an axis as recited in the claim.

With regard to claim 13, a computer-readable recording medium that stores encoded program instructions which cause the computer to execute the steps of a method is essential if the image processing apparatus disclosed in Lobregt is to function. Therefore, a computer-readable recording medium is inherent in the Lobregt teachings.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lobregt as applied to claim 6 above, and further in view of Poulo et al. (USPN 6,535,650).

Referring to claim 7, Lobregt discloses a means for obtaining a pair of 2D images, but fails to expressly disclose that this means comprises a digital camera. Poulo, however, discloses a digital camera for capturing a pair of 2D images (Poulo col. 2 lines 11-15). It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Lobregt's image processing apparatus by using a digital camera as a means for obtaining images. Such a modification would have allowed for an image processing apparatus which obtained images using a widely popular and ubiquitous means.

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7. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz et al ("Multiframe Integration via the projective transformation with automated block matching feature point selection") in view of Jasinski et al (USPN 6,504,569), and further in view of Nettles (USPN 5,430,806).

With regard to claim 1, the Schultz reference teaches a method for merging a pair of overlapping 2D images that are projections of a 3D scene. Schultz discloses selecting four feature points in the 3D scene and finding 2D coordinates (with respect to the original coordinate system of the two images) of the points in both images corresponding to the selected feature points (Schultz pg. 3266 left column, final paragraph). The variables, x_k and x'_k , disclosed in Schultz are analogous to the coordinates of the feature points in both images.

Schultz further discloses determining parameters of the projective transformation for application in original (non-translated) coordinate systems of the two images (Schultz pg. 3266 left column final paragraph) and merging the two images into a composite image by transforming one image according to the projective transformation into a transformed image and combining the transformed image with the other image (Schultz pg. 3266 right column step 7).

Schultz fails to expressly disclose the intermediate step of performing a translation of the original coordinate system of the two images to substantially minimize average coordinate ranges of the found 2D coordinates before determining the parameters of a substantially optimal projective transformation.

Jasinski, however, teaches translating the original coordinate system of selected 2D feature points such that the average coordinate ranges of the feature points is substantially minimized (Jasinski col. 6 lines 62-67). The step of coordinate calibration disclosed in the Jasinski reference is analogous to the translation of the original coordinate system recited in the claim in that the average coordinate ranges are substantially minimized (i.e. the spatial center of mass of the feature points is approximately at the (0,0) coordinate origin).

It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Schultz's image merging method by translating the coordinate system of the matched feature points before determining a projective transformation as taught by Jasinski. Such a modification would have allowed for a more stable determination of the projective transformation (Jasinski col. 6 line 67 – col. 7 line 1).

The Jasinski reference fails to expressly disclose the step of altering the projective transformation parameters in the translated coordinate systems using translation vectors that ensure an equivalence of the projective transformation in the original and translated coordinate systems is true. This step implies that the projective transformation (which is computed using the translated coordinate system) is applied in the original, untranslated coordinate system (see applicant's specification paragraph [0059]). The Jasinski reference, therefore, is deficient with respect to this limitation in that it discloses the translation of an original coordinate system before performing a transformation, but fails to expressly disclose that this transformation is applied in the original coordinate system.

Nettles, however, discloses translating an original coordinate system prior to performing a transformation and then translating the coordinate system back to its original state so that the transformation can be applied in the original non-translated coordinate system (Nettles col. 3 lines 21-37), and therefore meets all the additional limitations of claim 1. It would have been obvious to one reasonably skilled in the art at the time of the invention to

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modify Jasinski's image processing method by translating the transformed image back into the original coordinate system as taught by Jasinski. Such a modification would have allowed for viewing of the transformed image (Nettles col. 8 lines 14-21).

With regard to claim 2, Schultz further discloses automatic selection of feature points with sufficient surrounding structure for accurate matching of the corresponding 2D coordinates in the two images (Schultz pg 3266 left column final paragraph).

With regard to claim 3, Jasinski further discloses that translating comprises determining the translation for each image as the average of the 2D coordinates in that image (Jasinski col. 6 lines 62-67). Putting the coordinate origin at the spatial center of mass of the feature points as disclosed in Jasinski is analogous to taking an average of the 2D coordinates as recited in the claim.

With regard to claim 5, Schultz discloses calculating a least squares solution for the projective transformation. A least squares solution as disclosed in Schultz qualifies as a function for minimizing error as recited in the claim.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Schultz, Jasinski and Nettles as applied to claim 1 above, and further in view of well known prior art.

With regard to claim 4, Schultz discloses determining the projective transformation parameters through the use of a matrix operation. Claim 4 recites determining these parameters by performing a singular value decomposition. Singular value decomposition is well known in the art (Official Notice) as a method for solving a matrix. It would have been obvious to one reasonably skilled in the art at the time of the invention to modify Schultz's transformation parameter determination by specifying that the matrix operation was solved by a method of singular value decomposition. Such a modification would have allowed for a well known method of solving a matrix.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Mann et al. (USPN 5,706,416) discloses translating the coordinate systems of two images to a common coordinate system
- Hanna et al. (USPN 5,923,791) discloses geometric transformation between different coordinate systems.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick L Edwards whose telephone number is (703) 305-6301. The examiner can normally be reached on 8:30am - 5:00pm M-F.

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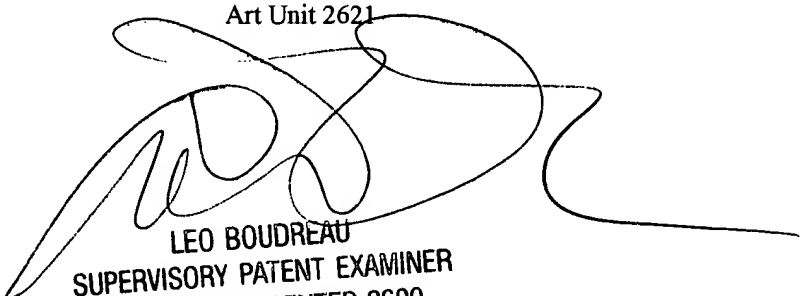
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick L Edwards

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